obtaining a linear instantaneous phase of each of said plurality of clock signals to be measured based on said instantaneous phase obtained; and

obtaining an ideal edge timing of each of said plurality of clock signals to be measured by obtaining an initial phase angle of said linear instantaneous phase.

911 31. A clock skew measuring method as claimed in claim 17, wherein said clock skew obtaining removes amplitude modulation components from said reference signal and each of said plurality of clock signals to be measured to extract phase modulation components thereof.

REMARKS

Please consider the above amendment the following remarks prior to examination of this application on the merits. The specification was amended to correct minor typographical errors by this preliminary amendment. Also, claims 3-5, 7-8, 13-14, 20-22, 24-25, and 31 were amended to remove multiple dependencies by this preliminary amendment. These amendments are fully supported by the original specification and no new matter was added by this preliminary amendment.

Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 02008/070001).

Respectfully submitted,

Date: 5/17/05

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Marked-Up Versions of the Specification and Claims

In the paragraph beginning on page 9, line 30:

Fig. 6A shows exemplary timing jitter sequence $\Delta\varphi^j[n]$ of a clock CLK_j to be measured.

In the paragraph beginning on page 9, line 32:

Fig. 6B shows exemplary timing jitter sequence $\Delta\varphi^k[n]$ of a clock CLK_k to be measured.

In the paragraph beginning on page 10, line 6:

Fig. 11 shows an exemplary [discontinuous] instantaneous phase $\varphi(t)$. The discontinuities at $-\Pi$ and $+\Pi$ are observed.

In the paragraph beginning on page 10, line 8:

Fig. 12 shows an unwrapped [continuous] instantaneous phase $\varphi(t)$. The discontinuities are removed.

In the paragraph beginning on page 10, line 22:

Fig. 21 shows an exemplary timing jitter sequence $\Delta\varphi[n]$.

In the paragraph beginning on page 13, line 11:

In the clock skew measuring method of the present embodiment, the distributed clocks to be measured are selected and brought out to the outside of the chip by means of a clock signal selector, for example, a multiplexer. Then, the time difference between the edge timing of the clock signal and the reference timing is measured for each of the selected clock signals, so that [an error of] the difference between the time differences thus measured is obtained, thereby measuring the clock skew. For simplification, the method for measuring the skew between two distributed clock signals is described below.

3. A clock skew measuring apparatus as claimed in claim 1 [or 2], wherein said clock skew estimator measures a deterministic component of said clock skew between said plurality of clock signals to be measured.

4. A clock skew measuring apparatus as claimed in claim 1 [or 2], wherein said clock skew estimator measures a random component of said clock skew between said plurality of clock signals to be measured.

5. A clock skew measuring apparatus as claimed in [any one of claims] claim 1 [to 4], wherein said clock skew estimator includes:

a timing estimator operable to obtain a reference timing that is an edge timing of said reference signal and a tested timing that is an edge timing of each of said plurality of clock signals to be measured;

a timing error estimator operable to obtain said timing difference between said tested timing and said reference timing; and

a clock skew calculator operable to obtain said clock skew between said plurality of clock signals to be measured from said timing difference obtained for each of said plurality of clock signals to be measured.

7. A clock skew measuring apparatus as claimed in claim 5 [or 6], wherein said timing estimator obtains a riding edge timing or a falling edge timing of each of said reference signal and said plurality of clock signals to be measured.

8. A clock skew measuring apparatus as claimed in claim 5 [or 6], wherein said timing estimator includes:

an analytic signal transformer operable to transform each of said plurality of clock signals to be measured into a complex analytic signal;

an instantaneous phase estimator operable to obtain an instantaneous phase of said analytic signal;

an linear instantaneous phase estimator operable to obtain a linear instantaneous phase of each of said plurality of clock signals to be measured based on said instantaneous phase obtained; and

an initial phase estimator operable to obtain an ideal edge timing of each of said plurality of clock signals to be measured by obtaining an initial phase angle of said linear instantaneous phase.

13. A clock skew measuring apparatus as claimed in [any one of claims] <u>claim</u> 1 [to 6], wherein said clock skew estimator includes an analog-to-digital converter operable to receive said reference signal and each of said clock signals to be measured and to digitize said reference signal and said each of said clock signals to be measured.

14. A clock skew measuring apparatus as claimed in [any one of claims] <u>claim</u> 1 [to 6], wherein said clock skew estimator includes a waveform clipper operable to receive said reference signal and each of said clock signals to be measured and to remove amplitude modulation components of said received clock signal to be measured to extract phase modulation components of said received clock signal.

20. A clock skew measuring method as claimed in [any of claims] <u>claim</u> 17 [to 19], wherein said clock skew estimating step measures a deterministic component of said clock skew between said plurality of clock signals to be measured.

21. A clock skew measuring method as claimed in [any of claims] <u>claim</u> 17 [to 19], wherein said clock skew estimating step measures a random component of said clock skew between said plurality of clock signals to be measured.

22. A clock skew measuring method as claimed in [any one of claims] <u>claim</u> 17 [to 21], wherein said clock skew estimating step includes:

obtaining an edge timing of said reference signal as a reference timing;

obtaining an edge timing of each of said plurality of clock signals to be measured as a tested timing;

obtaining said timing difference between said tested timing and said reference timing; and

obtaining said clock skew between said plurality of clock signals to be measured from said timing difference obtained for each of said plurality of clock signals to be measured.

24. A clock skew measuring method as claimed in claim 22 [or 23], wherein said obtaining of edge timing obtains a rising edge timing or a falling edge timing of each of said reference signal and said plurality of clock signals to be measured.

25. A clock skew measuring method as claimed in claim 22 [or 23], wherein said timing estimating includes:

transforming each of said plurality of clock signals to be measured into a complex analytic signal;

obtaining an instantaneous phase of said analytic signal;

obtaining a linear instantaneous phase of each of said plurality of clock signals to be measured based on said instantaneous phase obtained; and

obtaining an ideal edge timing of each of said plurality of clock signals to be measured by obtaining an initial phase angle of said linear instantaneous phase.

31. A clock skew measuring method as claimed in [any one of claims] <u>claim</u> 17 [to 19], wherein said clock skew obtaining removes amplitude modulation components from said reference signal and each of said plurality of clock signals to be measured to extract phase modulation components thereof.